Impact of Adult Immunization

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Wisconsin Adult Immunization Summit

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Objectives

- Provide an overview of the recommendations for vaccination of adults and the burden of illness among adults

- Review the impact of vaccines among adults for selected vaccine preventable diseases

- Describe standards for adult immunization practice, and estimates of implementation

- Describe resources to help with implementation of adult vaccination.
Disclosure

Dr. Carolyn Bridges has no financial relationships with any entity producing, marketing, re-selling, or distributing health care goods or services, consumed by, or used on, patients.

One unlicensed product will be mentioned and CDC-recommended off-label use of pneumococcal conjugate vaccine and vaccines in pregnancy will be discussed.
Burden of Disease Among U.S. Adults for Selected Diseases with Vaccines Available

- Zoster (shingles)¹
  - About 1 million cases of zoster annually U.S.

- Invasive pneumococcal disease (IPD)²
  - 33,900 total cases and 3,700 total deaths in 2013
    - 89% of IPD cases and nearly all IPD deaths among adults

- Pertussis (also known as whooping cough)³
  - ~28,000 cases per year for 2013 and 2014
    - ~9,000 among adults

- Hepatitis B⁴
  - 3,050 acute cases reported 2013
    - 19,800 estimated cases

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Figure 1: Impact of herpes zoster on health-related quality of life. Shown are the percentages of participants (n = 261) who reported problems in the EuroQol EQ-5D domains at the time of recruitment (< 14 days after rash onset) and after the pain stopped. Median duration of pain was 32.5 days. Error bars = 95% confidence intervals.
Impact of Vaccination - Zoster

- Vaccine effectiveness varies by vaccine type, the disease outcome, and the age or health of the person vaccinated

- Zoster (Shingles) vaccine effectiveness:
  - 51% against shingles
  - 66% against post-herpetic neuralgia (PHN),
  - 80% against most prolonged and extreme cases of PHN

Unlicensed Vaccine Clinic Recently Presented at Advisory Committee on Immunization Practices (ACIP)

- **Inactivated adjuvanted herpes zoster vaccine**
  - Not licensed
  - Results of phase III clinical trial among >15,000 persons 50 years and older presented at ACIP in June 2015
  - VE against shingles: 96% (95% CI=93-98%) with VE estimates similar for 50, 60, and 70 year old participants
  - 17% of vaccinated and 3% of placebo with Grade 3 symptoms

- **Points to need for improved platform for delivery of current and future adult vaccines**

1. Lal H, et al. NEJM 2015 and other more recent studies affirming high vaccine effectiveness in adults ≥50 and ≥70 yrs.
Incidence of IPD in adults aged 18–64 years with selected underlying conditions, United States, 2009

Kyaw, JID 2005;192:377-86

Cases per 100,000 persons

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cases per 100,000 persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>8</td>
</tr>
<tr>
<td>CVD</td>
<td>26</td>
</tr>
<tr>
<td>Diabetes + Pulmonary</td>
<td>28</td>
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<tr>
<td>Kidney</td>
<td>32</td>
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<tr>
<td>Liver</td>
<td>41</td>
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<tr>
<td>Alcohol</td>
<td>52</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>173</td>
</tr>
<tr>
<td>Hematological Cancer</td>
<td>186</td>
</tr>
</tbody>
</table>

- 20 fold increased risk
- 3-7 fold increased risk
Impact of Vaccination – Pneumococcal Vaccines

- Vaccine effectiveness varies by vaccine type, the disease outcome, and the age or health of the person vaccinated
  - PCV13 (pneumococcal conjugate vaccine):
    - 45% efficacy against vaccine-type pneumococcal pneumonia,
    - 75% efficacy against vaccine-type invasive pneumococcal disease (IPD) among adults aged ≥65 years
  - PPSV23 (pneumococcal polysaccharide)
    - 74% (CI 55-86%) in meta-analysis against IPD
    - Not effective against non-IPD pneumonia

<table>
<thead>
<tr>
<th>Risk group</th>
<th>Underlying medical condition</th>
<th>PCV13</th>
<th>PPSV23 &lt;65 yrs</th>
<th>PPSV23 5-yr Revaccination</th>
<th>PPSV23 ≥65 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immune competent persons</td>
<td>Chronic heart disease†</td>
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<td></td>
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<tr>
<td></td>
<td>Chronic lung disease§</td>
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<tr>
<td></td>
<td>Diabetes mellitus</td>
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<tr>
<td></td>
<td>Cerebrospinal fluid leak</td>
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<td>Cochlear implant</td>
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<td></td>
<td>Alcoholism</td>
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<td>Chronic liver disease, cirrhosis</td>
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<tr>
<td></td>
<td>Cigarette smoking</td>
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<tr>
<td>Persons with functional or anatomic asplenia</td>
<td>Sickle cell disease/other hemoglobinopathy</td>
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<tr>
<td></td>
<td>Congenital or acquired asplenia</td>
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<tr>
<td>Immunocompromised persons</td>
<td>Congenital or acquired immunodeficiency</td>
<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td></td>
<td>Human immunodeficiency virus infection</td>
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<td></td>
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<tr>
<td></td>
<td>Chronic renal failure</td>
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<td>✔</td>
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<tr>
<td></td>
<td>Nephrotic syndrome</td>
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<td></td>
<td>Leukemia</td>
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<tr>
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<td>Lymphoma</td>
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<td></td>
<td>Hodgkin disease</td>
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<tr>
<td></td>
<td>Generalized malignancy</td>
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<td>✔</td>
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<tr>
<td></td>
<td>Iatrogenic immunosuppression**</td>
<td>✔</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Solid organ transplant</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>Multiple myeloma</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

Source: National Notifiable Diseases Surveillance System (NNDSS)
Impact of Vaccination – Hepatitis B

- Hepatitis B vaccine:
  - Recently added adults with diabetes to those recommended for vaccination
  - 90% effectiveness after completing 3-dose series
  - Effectiveness estimated to be lower in persons with diabetes with increasing age
    - 90% age <40 years
    - 80% 41–59 years
    - 65% 60–69 years
    - <40% if 70 years or older with diabetes

CDC. Use of hepatitis B vaccine for adults with diabetes mellitus. MMWR2011;60:1709-1711.
Impact of Vaccination - Influenza

- Effectiveness varies based on antigenic match and age and health of person being vaccinated
  - ~60–70% effective in younger adults when good match
  - ~30% in adults ≥65 years against medically attended influenza when good match

- 2015-16 mid-season estimate:
  - 59% (95% CI = 44 - 70%) effective against medically attended, lab-confirmed influenza

2. Presented at February 2016 ACIP meeting.
Impact of Influenza Vaccination, Illnesses and Hospitalizations Prevented, 2011-2016

Cases and Hospitalizations Averted by Vaccination

- Hospitalizations
- Cases

Influenza Season:
- 11-12
- 12-13
- 13-14
- 14-15
- 15-16

# of Hospitalizations Averted:
- 11-12: Moderate
- 12-13: Moderate
- 13-14: High
- 14-15: Moderate
- 15-16: High

Number of cases and hospitalizations averted by vaccination across different influenza seasons.
Influenza Health Impact

- Influenza disease burden varies year to year
  - Millions of cases and average of 226,000 hospitalizations annually with >75% among adults\(^1\)
  - 3,000-49,000 deaths annually, >90% among adults\(^2\)

- Direct medical costs in U.S.: ~$10.4 billion\(^3\)

- Add in loss of work and life: ~$87 billion

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Impact of Vaccination - Influenza

- Effective in preventing major cardiac events among persons with existing cardiovascular disease\(^1\)\(^-\)\(^4\)
  - Meta-analysis of case control studies: \(^3\)
    - Acute respiratory illness/ILI increases acute MI risk by 2-fold
    - Influenza vaccination efficacy (VE) 29% (95% CI=9-44%) against acute MI
  - Meta-analysis of randomized studies of persons with existing CVD\(^4\) influenza VE 36% (95% CI=14% to 53%)

Impact of Vaccination - Influenza

- “We calculated a pooled VE of 29% (95% CI 9% to 44%) in preventing AMI, on a par with or better than accepted AMI preventive measures, with the estimates of the efficacy of statins for secondary prevention of 36%, anti-hypertensives of 15%–18% and smoking cessation interventions of 26.”

- Influenza vaccination recommended as secondary prevention by American College of Cardiology and American Heart Association

Vaccination of Adults 65 Years and Older

- High dose influenza vaccine
  - Inactivated trivalent vaccine – 4 times the antigen as standard dose (60 µg antigen per vaccine strain vs 15 µg in standard dose)
  - Licensed 2009 based on improved immunogenicity compared to standard dose for influenza A (H1N1) and A (H3N2) and non-inferior immune response for influenza B.
  - RCT found relative efficacy of high-dose relative to standard dose vaccine of 24% (CI 9.7-36.5) against laboratory confirmed influenza
  - Cohort study by CMS comparing persons with a claim for standard versus high dose vaccine found 22% (CI 16-27%) reduction in influenza-related hospitalization

Vaccination of Adults 65 Years and Older

- Adjuvanted inactivated trivalent influenza vaccine
  - MF-59 adjuvant is oil-in-water emulsion
  - Licenses in Europe for many years
  - Licensed in US in November 2015 based on immunogenicity > 65 yrs
  - No RCT in older adults, however clinical efficacy trial of quadrivalent MF-59 vaccine post-licensure required

- Cohort study in Italy using administrative database estimated 25% (CI 2-43) lower risk influenza-related hospitalization for MF-59 adjuvanted vaccine vs non-adjuvanted

Influenza Vaccine during Pregnancy Protects Infants < 6 Months of Age from Laboratory-Proven Influenza

Maternal Influenza Vaccine’s Effects on Fetus/Newborn

- **Observational study from Georgia PRAMS**
  - Infants whose mothers who received influenza vaccine prenatally were less likely to be preterm (aOR=0.60, 95% CI 0.38-0.94) and SGA (aOR= 0.31, 95% CI 0.13-0.75).

- **Observational study from Ontario**
  - Infants whose mothers received H1N1 vaccine prenatally less likely to be SGA (aRR=0.90; 95% CI 0.85, 0.96) or preterm (<32 weeks) (aRR = 0.73; 95% CI = 0.58, 0.91). Fetal loss aRR = 0.66; 95% CI = 0.47, 0.91.

- **Observational study: Kaiser Permanente**
  - Infants whose mothers who received H1N1 vaccine prenatally had 37% lower odds of being born preterm (aOR 0.63; 95%CI 0.47-0.84).

SGA=small for gestational age; aOR=adjusted odds ratio; aRR=adjusted relative risk.
Influenza Vaccination Coverage among Pregnant Women by Provider Recommendation and Offer, 2015-2016 Influenza Season

Percent Vaccination

- Offer: 58.8%
- Recommend/no offer: 20.1%
- No recommendation or offer: 7.1%
Td/Tdap Vaccination of Adults

- Td – give as booster shot every 10 years or after high risk exposure under some circumstances.
- Tdap – also contains protection against pertussis - adolescents (preferably given at age 11-12 years – 2006 recommendation) and adults 19 and older should receive a single dose of Tdap if no prior history Tdap
- Pregnant women recommended to get Tdap vaccine 3rd trimester each pregnancy
Reported Pertussis Cases, United States -- 1922-2014

CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service
DTaP effectiveness (California, 2010\(^1\)) and Tdap effectiveness (Washington, 2012\(^2\)) by time since last dose*

1\(^{JAMA. 2012;308:2126-2132. *Accounting for clustering by county and provider\)
2\(^{CDC, unpublished data.}\)
**Effectiveness of Maternal Pertussis Vaccination -- United Kingdom**

- Observational study
- Vaccine effectiveness (VE) calculated by comparing vaccination status for mothers of confirmed cases with estimates of vaccine coverage for national population of pregnant women

<table>
<thead>
<tr>
<th>Vaccine effectiveness</th>
<th>Timing of maternal vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>91% (83-95)</td>
<td>At least 28 days before birth</td>
</tr>
<tr>
<td>38% (-95-80)</td>
<td>0-6 days before or 1-13 days after birth</td>
</tr>
</tbody>
</table>
Meningococcal Incidence in All Ages by Serogroup and Adolescent MenACWY Vaccine Coverage, 1993–2013

2013: 564 cases\(^3\) (0.18/100,000)
2013 MenACWY coverage, NIS-Teen\(^2\):
- ≥1 dose: 77.8% (range by state, 40.4%-93.7%)
- 2 dose completion: 29.6%
Estimated Average Annual Cases, Deaths, and Sequelae by Age Group and Serogroup, 2009–2013

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Cases(^1)</th>
<th>Deaths(^2)</th>
<th>Sequelae(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serogroup B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 years</td>
<td>74–94</td>
<td>7-14</td>
<td>7-19</td>
</tr>
<tr>
<td>11-24 years</td>
<td>54–67</td>
<td>5-10</td>
<td>5-13</td>
</tr>
<tr>
<td>All ages</td>
<td>203–260</td>
<td>20-39</td>
<td>20-52</td>
</tr>
<tr>
<td>Serogroups C &amp; Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 years</td>
<td>34–43</td>
<td>3-6</td>
<td>3-9</td>
</tr>
<tr>
<td>11-24 years</td>
<td>62–77</td>
<td>6-12</td>
<td>6-15</td>
</tr>
<tr>
<td>All ages</td>
<td>307–393</td>
<td>31-59</td>
<td>31-79</td>
</tr>
</tbody>
</table>

- The majority (~80%) of serogroup B cases that occur in 11–24 year olds occur in older adolescents and young adults aged 16–24 years

\(^1\) Range in estimated cases: Low=NNDSS data supplemented with additional serogroup data from ABCs and state health departments, High= NNDSS data supplemented with additional serogroup data from ABCs and state health departments + proportion serogroup B or serogroup C & Y applied to cases with unknown serogroup.
\(^2\) 10-15% case fatality ratio
\(^3\) 10-20% cases with long term sequelae
Percentage of cervical cancers attributed to high risk HPV types, worldwide

de Sanjose et al. Lancet 2010 % of HPV positives and are based on the upper estimate attribution of multiple HPV types
## Estimated percentages of cancers attributed to HPV in the U.S.

<table>
<thead>
<tr>
<th>Cancer</th>
<th>HPV attributable % (95% CI)</th>
<th>HPV 16/18 attributable % (95% CI)</th>
<th>HPV 31/33/45/52/58 attributable % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical</td>
<td>91 (88-92)</td>
<td>66 (63-69)</td>
<td>15 (12-17)</td>
</tr>
<tr>
<td>Vaginal</td>
<td>75 (63-84)</td>
<td>55 (43-67)</td>
<td>18 (11-30)</td>
</tr>
<tr>
<td>Vulvar</td>
<td>69 (62-75)</td>
<td>49 (41-56)</td>
<td>14 (10-20)</td>
</tr>
<tr>
<td>Penile</td>
<td>63 (52-73)</td>
<td>48 (37-59)</td>
<td>9 (4-17)</td>
</tr>
<tr>
<td>Anal Male</td>
<td>89 (77-95)</td>
<td>79 (66-88)</td>
<td>4 (1-13)</td>
</tr>
<tr>
<td>Anal Female</td>
<td>92 (85-96)</td>
<td>80 (70-87)</td>
<td>11 (6-19)</td>
</tr>
<tr>
<td>Oropharyngeal</td>
<td>72 (68-76)</td>
<td>63 (59-68)</td>
<td>4 (3-7)</td>
</tr>
<tr>
<td>Oropharyngeal Female</td>
<td>63 (55-71)</td>
<td>51 (43-59)</td>
<td>9 (6-15)</td>
</tr>
</tbody>
</table>

Adapted from Saraiya, presented at AIN Conference, March 13–15, 2015, Atlanta, GA.
Estimated numbers of HPV-associated cancers attributable to HPV 16/18 and 5 additional types in 9-valent vaccine, U.S.*

*Based on years 2006-2010 [http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6349a11.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6349a11.htm) and data from Saraiya, presented at AIN Conference, March 2015
Vaccination Coverage Rates

* The Healthy People 2020 target for coverage is 90% for all vaccines with the exception of rotavirus (80%) and HepA (85%).

† DTP (3+) is not a Healthy People 2020 objective. DTaP (4+) is used to assess Healthy People 2020 objectives.

§ Reflects 3+ doses through 2008, and Full Series (3 or 4 doses depending on type of vaccine received) 2009 and later.

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† DTP (3+) is not a Healthy People 2020 objective. DTaP (4+) is used to assess Healthy People 2020 objectives.
§ Reflects 3+ doses through 2008, and Full Series (3 or 4 doses depending on type of vaccine received) 2009 and later.
Estimated HPV Vaccination Coverage among Adolescents Aged 13-17 Years, NIS-Teen, United States, 2006-2014

Revised APD* definition

≥1 Tdap
≥1 MenACWY
≥1 HPV (F)
≥1 HPV (M)
≥3 HPV (F)
≥3 HPV (M)

MMWR 64(29);784-792 * APD = Adequate provider data
Proportion of adults reporting vaccination for selected vaccines, by age group and high risk status, National Health Interview Survey (NHIS), United States, 2010-2014
Association of Health Insurance Status and Usual Place of Health Care with Vaccination Coverage

- 87% reported some type of health insurance
- Coverage 2-5 times higher for persons with health insurance for influenza, Tdap, herpes zoster, and HPV vaccinations
- Even among insured persons with >10 physician contacts in past 12 months, 24% - 89% missing a recommended vaccine
  - E.g. 65% diabetics missing hepatitis B vaccine, 61% high risk persons 18-64 yrs missing pneumococcal vaccine.

Adult Immunization Practice Standards

- Assess immunization status of all patients in every clinical encounter.

- Strongly recommend vaccines that patients need.

- Administer needed vaccines or Refer to a provider who can immunize.

- Document vaccines received by patients, including entering immunizations into immunization registries where available.

http://www.publichealthreports.org
Surveys of Application of the Standards

- General adult population
  - **Received** standards during visits to healthcare providers (HCPs) and pharmacists
  - Received assessment, recommendation, offer or referral, vaccination
- **Internet panel of adults (KnowledgePanel)**
  - Probability-based, representative of U.S.
  - Visits to HCP or pharmacy
  - Weighted
- **Outpatient settings**

- Healthcare providers and pharmacists
  - **Implemented** standards during patient encounters
  - Assess, recommend, administer or refer, document
- **Internet panel of physicians, NPs, PAs, pharmacists (Medscape)**
  - Internal medicine, family medicine, ob/gyn, specialty care; dispensing pharmacists
  - Weighted
- **Outpatient settings**
Self-reported receipt of vaccination assessment by adults during most recent visit to healthcare provider or pharmacy in past 12 months, by practice specialty/type, United States, Feb–Mar 2016

Note: The sum of the numbers of adult vaccination service provider visits do not add up to the total number of visits because adult vaccination service provider visits are weighted.
Self-reported implementation of standards for adult immunization practice by HCPs and pharmacists, by profession, United States, Feb–Mar 2016 (N=1918)
Self-reported implementation of standards for adult immunization practice by HCPs and pharmacists, by specialty, United States, Feb–Mar 2016 (N=1918)
Self-reported assessment of adult vaccination by HCPs and pharmacists compared to general adult population, United States, Feb–Mar 2016

<table>
<thead>
<tr>
<th>Location of adult vaccination assessment</th>
<th>Adult care provider</th>
<th>General adult population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Medicine</td>
<td>96.9</td>
<td>38.2</td>
</tr>
<tr>
<td>Family Medicine</td>
<td>95.3</td>
<td>31.5</td>
</tr>
<tr>
<td>Ob/Gyn</td>
<td>84.3</td>
<td>8.4</td>
</tr>
<tr>
<td>Specialty Care</td>
<td>67</td>
<td>18.5</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>68.3</td>
<td>8.7</td>
</tr>
</tbody>
</table>
Survey Limitations

- Sampling bias – self-selected, opt-in internet panels of HCPs/pharmacists and general adult population
- Recall bias
- Self-reported, no validation
- HCPs/pharmacists may generalize and overestimate
- General adult population may not know “what goes on behind the scene” and underestimate
Improving Adult Immunizations -
What Can Be Done To Improve Adult Immunizations?

- Identify barriers in your community and in your practice
  - Usability, access to, and use of IIS by all vaccine providers
  - On-site vaccination
  - Payment and in-network barriers
  - Systems changes to incorporate vaccination into patient flow

- Improve awareness and relevance for public and medical professionals
  - Targeted CDC adult vaccine quiz promotion and patient-tailored recommendations
  - Reminder/recall of patients

- Immunization training of medical, nursing and pharmacist students
  - ACOG, APhA, and San Diego residency training program examples
### Meta-Analysis of Interventions to Increase Use of Adult Immunization

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Odds Ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational change (e.g., standing orders, separate clinics devoted to prevention)</td>
<td>16.0</td>
</tr>
<tr>
<td>Provider reminder</td>
<td>3.8</td>
</tr>
<tr>
<td>Patient financial incentive</td>
<td>3.4</td>
</tr>
<tr>
<td>Provider education</td>
<td>3.2</td>
</tr>
<tr>
<td>Patient reminder</td>
<td>2.5</td>
</tr>
<tr>
<td>Patient education</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*Compared to usual care or control group, adjusted for all remaining interventions

ConsumerStyles Survey Background

- Annual series of self-administered, online market research surveys
- KnowledgePanel ® (formerly Knowledge Networks) collects all data for Styles surveys using probability-based sampling of panelists online
- FallStyles (September-October)
  - Sent to a random sample of households that returned SpringStyles surveys to ensure a minimum of 3500 completed surveys
  - Included questions 2012 - 2015
- Data are weighted to previous year’s Current Population Survey of the U.S. Census
  - Gender, age, race/ethnicity, household income, household size
### Vaccination Decision-Making: Overall

<table>
<thead>
<tr>
<th>Which of the following best describes you?</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not aware that I need any vaccines as an adult <em>besides the flu vaccine.</em></td>
<td>19%</td>
</tr>
<tr>
<td>I am aware that I need a vaccine as an adult besides the flu vaccine, but haven’t thought about getting it.</td>
<td>6%</td>
</tr>
<tr>
<td>I am considering getting vaccinated against a disease other than the flu but have not yet decided.</td>
<td>5%</td>
</tr>
<tr>
<td>I have decided to get vaccinated against a disease other than the flu, but have not yet gotten vaccinated.</td>
<td>6%</td>
</tr>
<tr>
<td>I have decided not to get vaccinated against a disease other than the flu.</td>
<td>7%</td>
</tr>
<tr>
<td>I have gotten vaccinated against a disease other than flu as an adult.</td>
<td>19%</td>
</tr>
<tr>
<td>I make sure I am up-to-date with recommended vaccinations.</td>
<td>39%</td>
</tr>
</tbody>
</table>

*All percentages are weighted.*

## Decision-Making by Vaccine Type, 2015

<table>
<thead>
<tr>
<th>Decision Model</th>
<th>Tdap (19+)</th>
<th>Pneumo (65+)</th>
<th>Zoster (60+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not aware that I need this vaccine.</td>
<td>52%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>I am aware that I need this vaccine, but haven’t thought about getting it.</td>
<td>6%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>I am considering getting this vaccine, but have not yet decided.</td>
<td>5%</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>I have decided to get this vaccine, but have not yet gotten vaccinated.</td>
<td>3%</td>
<td>4%</td>
<td>8%</td>
</tr>
<tr>
<td>I have decided not to get this vaccine.</td>
<td>13%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>I have gotten this vaccine.</td>
<td>22%</td>
<td>56%</td>
<td>39%</td>
</tr>
</tbody>
</table>

*All percentages are weighted.

In the past year, has this vaccine been recommended to you by a medical professional?

*All percentages are weighted

CMS Quality Payment Program (QPP)

- Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) ended Sustainable Growth Rate formula
- Two tracks for Medicare providers:
  - Advanced Alternative Payment Models (APMs)
  - Merit-based Incentive Payment System (MIPS)
- Vaccination related activities for MIPS points
  - Quality points – pediatric, adolescent vaccination measures and influenza vaccination for all ages
  - Advancing care – reporting to IIS not required, but bonus points
  - Improvement activities – Vaccine-related MOC activities

https://qpp.cms.gov/
Maintenance of Certification / Quality Improvement Resources

• MedConcert™ and American College of Physicians
  – Platform for patient safety, quality, and performance improvement. MOC credit available

• The 4 Pillars ™ Immunization Toolkit and University of Pittsburgh
  – Program helps providers implement systems to improve vaccination including standing orders
  – American Board of Family Medicine approved for MOC

• PROTECT™ and University of Nebraska
  – Includes outcomes measurement platforms and strategies to increase immunization rates. CE credit is available

http://www.cdc.gov/vaccines/ed/quality-improvement-proj.htm
Resources For Implementing Standards


- Patient on-line quiz – direct patients to complete the quiz before coming to their appointment – gives them and you a starting point for talking about which vaccines they might need. http://www2.cdc.gov/nip/adultimmsched/.

Resources From Professional Provider Organizations on Adult Immunizations

- American College of Physicians - http://immunization.acponline.org/ has information about adult vaccinations, quality improvement, resources for practical application, and information on special populations. Download the ACP Immunization Advisor App here: http://bit.ly/ACPapp


- American Academy of Physician Assistants – http://www.aapa.org has information on professional recommendations for immunization practice.

- American College of Obstetricians and Gynecologists - www.immunizationforwomen.org information about vaccines for pregnant and non-pregnant women, vaccine coding and other business practices


- Infectious Diseases Society of America - http://www.idsociety.org/Immunization/. Provides multiple resources and also recommendations specifically for immune compromised persons.
Patient Education Materials: General

Vaccines

What You Need to Know About Shingles and the Shingles Vaccine

In the U.S., currently, 1 in 3 adults get shingles every year, and about 2 out of every 3 people will get shingles in their lifetime. If you have chickenpox, you are at risk of getting shingles:

- One out of every three people 60 years old or older will get shingles.
- One out of six people older than 80 years old will get shingles.
- Shingles is more common in some groups, such as those who are older, have a weakened immune system, or have had chickenpox in the past.
- The risk of getting shingles increases with age.

Vaccines are important for adults:

- Prevents serious illness and complications.
- Reduces the risk of getting shingles and the severity of symptoms.
- Only one dose of the shingles vaccine is needed.

What are the side effects of the Shingles vaccine?

Common:
- Pain, redness, or tenderness at the injection site
- Fever

Less common:
- Swelling
- Skin rash

Rare:
- Systemic reaction that may cause fever, headache, body aches, and shivering

The Shingles vaccine may cause side effects that are similar to the symptoms of shingles.

Protect Yourself Against Shingles

Adults 60 years and older should talk to their healthcare professional about getting a dose of the shingles vaccine.

Shingles can cause serious skin and eye infections, and can cause severe and widespread pain.

Talk to your healthcare provider for more information and to find out if the shingles vaccine is right for you.

www.cdc.gov/vaccines/AdultPatientEd
Patient Education Materials: Chronic Conditions

www.cdc.gov/vaccines/AdultPatientEd
Conclusions

- Substantial burden of disease in adults for which vaccines are recommended either primarily for adults or as catch-up vaccines
- Vaccination rates low among adults in U.S., leaving adults unnecessarily vulnerable to illnesses that can be prevented
  - Do not reflect patient or provider interest in vaccines
- Although barriers exist, tools and resources available to improve vaccine uptake
Pneumococcal Vaccination Recommendations

- One dose PCV13 indicated for all adults
  - Timing of PCV13 depends on age and health conditions

- No additional doses of PPSV23 if received PPSV23 ≥65 years

- When both PCV13 and PPSV23 indicated, give PCV13 first

- Do not give PCV13 and PPSV23 during same visit

- If incomplete or unknown pneumococcal vaccination history, administer PCV13 and PPSV23 as indicated

- Administer PPSV23 12 months after PCV13 for adults ≥65
  - EXCEPT ...Adults ≥19 with immunocompromising conditions, anatomical or functional asplenia, cerebrospinal fluid leak or cochlear implant—PPSV23 ≥8 weeks after PCV13
Case Study: Earl Lee Riser

- Mr. Riser is 40 yo man, recently diagnosed with diabetes, splenectomy age 25 yrs after car accident.
- Had all vaccines recommended when he was a child.
- State immunization registry shows he had a Td booster age 25 yrs.
- He had chicken pox as a child.
- *Which vaccines should you recommend?*
# Recommended Adult Immunization Schedule—United States - 2016

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

## Figure 1. Recommended immunization schedule for adults aged 19 years or older, by vaccine and age group

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>AGE GROUP</th>
<th>19-21 years</th>
<th>22-26 years</th>
<th>27-49 years</th>
<th>50-59 years</th>
<th>60-64 years</th>
<th>≥ 65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza</td>
<td>1 dose annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)&lt;sup&gt;1,3&lt;/sup&gt;</td>
<td>Substitute Tdap for Td once, then Td booster every 10 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella&lt;sup&gt;4&lt;/sup&gt;</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female&lt;sup&gt;5,7&lt;/sup&gt;</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male&lt;sup&gt;5&lt;/sup&gt;</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster&lt;sup&gt;6&lt;/sup&gt;</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)&lt;sup&gt;1,7&lt;/sup&gt;</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal 13-valent conjugate (PCV13)&lt;sup&gt;1,4&lt;/sup&gt;</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal 23-valent polysaccharide (PPSV23)&lt;sup&gt;8&lt;/sup&gt;</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A&lt;sup&gt;3&lt;/sup&gt;</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B&lt;sup&gt;9&lt;/sup&gt;</td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal 4-valent conjugate (MenACWY) or polysaccharide (MPSV4)&lt;sup&gt;10&lt;/sup&gt;</td>
<td>1 or more doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal B (MenB)&lt;sup&gt;11&lt;/sup&gt;</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae type b (Hib)&lt;sup&gt;12&lt;/sup&gt;</td>
<td>1 or 3 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup>Covered by the Vaccine Injury Compensation Program

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Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at [www.vaers.hhs.gov](http://www.vaers.hhs.gov) or by telephone, 800-822-7967.

Information on how to file a Vaccine Injury Compensation Program claim is available at [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation) or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines) or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention’s (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), the American College of Obstetricians and Gynecologists (ACOG) and the American College of Nurse-Midwives (ACNM).
Figure 2. Vaccines that might be indicated for adults aged 19 years or older based on medical and other indications

<table>
<thead>
<tr>
<th>VACCINE ▶</th>
<th>INDICATION ▶</th>
<th>Pregnancy</th>
<th>Immuno-compromising conditions (excluding HIV infection)</th>
<th>HIV Infection CD4+ count (cells/μL)</th>
<th>Men who have sex with men (MSM)</th>
<th>Kidney failure, end-stage renal disease, on hemodialysis</th>
<th>Heart disease, chronic lung disease, chronic alcoholism</th>
<th>Aplasia and persistent complement component deficiencies</th>
<th>Chronic liver disease</th>
<th>Diabetes</th>
<th>Healthcare personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza*</td>
<td>1 dose annually</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)*</td>
<td>1 dose Tdap (multiprof.)</td>
<td>Substitute Tdap for Td once, thenTd booster every 10 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Varicella*</td>
<td>Contraindicated</td>
<td>2 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Female</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 26 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV) Male</td>
<td>3 doses through age 26 yrs</td>
<td>3 doses through age 21 yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster*</td>
<td>Contraindicated</td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)*</td>
<td>Contraindicated</td>
<td>1 or 2 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal 13-valent conjugate (PCV13)*</td>
<td>1 dose</td>
<td>1, 2, or 3 doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)*</td>
<td></td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A*</td>
<td></td>
<td>3 doses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B*</td>
<td></td>
<td>1 or more doses depending on indication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal 4-valent conjugate (MenACWY) or polysaccharide (MenPSV4)*</td>
<td>2 or 3 doses depending on vaccine</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal B (MenB)*</td>
<td></td>
<td>1 dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae type b (HiB)*</td>
<td></td>
<td>Recommended for all persons who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; zoster vaccine is recommended regardless of past episode of zoster</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

*Covered by the Vaccine Injury Compensation Program

Recommended for all persons who meet the age requirement, lack documentation of vaccination, or lack evidence of past infection; zoster vaccine is recommended regardless of past episode of zoster

Recommended for persons with a risk factor (medical, occupational, lifestyle, or other indication)

No recommendation

Contraindicated

These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly recommended for adults aged ≥19 years, as of February 2016. For all vaccines being recommended on the Adult Immunization Schedule, a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated and when the vaccine's other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices (www.cdc.gov/vaccines/hcp/acip-recs/default.htm). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.
Case Study: Earl Lee Riser

- Vaccines recommended based on age
  - Influenza vaccine
  - Tdap
- Plus vaccines based on diabetes
  - Pneumococcal PCV13 followed >8 weeks by PPSV23
  - Hepatitis B
- Plus vaccines based on asplenia
  - Meningococcal MenACWY
  - Meningococcal B
  - Hib
Adult Vaccination Coverage, Selected Vaccines by Age and High-risk Status, United States

Pneumococcal, HR 19-64yrs

Pneumococcal, ≥65 yrs

Herpes Zoster (Shingles), ≥60 yrs

HP2020 Targets: 60% PPV HR 19-64 years, 90% PPV ≥65 years, 30% Shingles

HP2020 Targets: 60% PPV HR 19-64 years, 90% PPV ≥65 years, 30% Shingles

Adult Tetanus-containing Vaccination Coverage by Age and High-risk Status, United States

- Td past 10 yrs, 19-49 yrs: 63%
- Td past 10 yrs, 50-64 yrs: 65%
- Td past 10 yrs, ≥65 yrs: 58%
- Tdap past 9 yrs, ≥19 yrs: 20% (+2.9)
- Tdap past 9 yrs, Living…: 32%
- Tdap past 9 yrs, HCP ≥19 yrs: 42%

Hepatitis B Vaccination Coverage by Age and High-risk Status, United States

HP2020 Target: 90% HepB Healthcare Personnel (HCP)
Data Source: 2014 NHIS

HPV Vaccination Coverage (≥1 dose ever), Adults 19-26 years of age by Sex, United States

<table>
<thead>
<tr>
<th></th>
<th>% Vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females 19-26 yrs</td>
<td>40</td>
</tr>
<tr>
<td>Females 19-21 yrs</td>
<td>45</td>
</tr>
<tr>
<td>Females 22-26 yrs</td>
<td>38 (+5.3)</td>
</tr>
<tr>
<td>Males 19-26 yrs</td>
<td>8</td>
</tr>
<tr>
<td>Males 19-21 yrs</td>
<td>13 (+5.6)</td>
</tr>
<tr>
<td>Males 22-26 yrs</td>
<td>5</td>
</tr>
</tbody>
</table>

Data Source: 2014 NHIS

Adult Influenza Vaccination Coverage by Age, 2013-14 season, United States, 2014 NHIS

- Influenza, ≥19 yrs: 43%
- Influenza, 19-49 yrs: 32%
- Influenza, 50-64 yrs: 48%
- Influenza, ≥65 yrs: 72%
- Influenza, ≥19 yrs, HCP: 65%

- HP2020 Targets: 70% ≥19 years, 90% HCP ≥19 years
- BRFSS estimates for 2013-14: 42.2% (18+), 32.2% (18-49), 45.3% (50-64), 65.0% (65+)
- HCP internet panel survey 2013-14: 75.2%